THE

TELEGRAPHIC JOURNAL

AND

ELECTRICAL REVIEW.

VOL. XII.

JANUARY 6—JUNE 30, 1883.

LONDON:

H. ALABASTER, 22, PATERNOSTER ROW.

JUN 2

London:
PRINTED BY H. BLACKLOCK & CO.,
FARRINGDON ROAD AND CROSS STREET, E.C.

INDEX.

1883.

ACADÉMIE DES SCIENCES DE PARIS, 290
Accumulator, Electrical,
" " Professor Forbes', 232
" " M. Reynier's, 428
Accumulators, Electrical, 42
" " Faure-Sellon-Volckmar, 273
" " Planté and Faure. Chemistry of, 334
Albo-Carbon Light Company, 371
American Bell Telephone Company, 331
Ampère-Meter for electric light installations and other general purposes, 371
Ampères, On an experiment of, 208
Analogies between Hydrodynamic and Electric Phenomena, 208
Anglo-American Brush Electric Light Corporation, 165
Armature, The Crompton Step-wound, 61
Awards, Society of Arts, 536
Ayrton *v.* Paterson & Co., 357, 386, 399

BATTERY, A new form of, for producing an intense constant current of long duration, 415
" Bennett's patent iron, 539
" Chloride of silver, 513
" Combined, and detector, 519
Battery-cell, A new form of, 520
BATTERIES—
Callaud's sulphate of copper, 57
Primary, 447
Scrivanow's chloride of silver, 280
Secondary, 436
By Geo. F. Barker, 299, and the electrical storage of power, 447, 469
Employment of, in electric lighting, 477
Storage, 454
Trouvé's bichromate of potash, 349
Bengal Telephone Company, 334
Board of Trade and Prof. Tyndall, 399, 422, 470
British Electric Light Company, and the Electric Power Company *v.* The Anglo-American Brush Electric Corporation, 315, 420
" and Irish Telephone and Electric Works Company, 420
" Insulite Company's works, 509
Brush Electric Light and Power Company, of Australasia, 205
" " " Power Company, of Scotland, 476

CABLE.
Atlantic, Proposed new, 119
China, Duplicating, 70,
contracts, 522
Manufacturing, 374
Repairing Ships, New, 53
Steamer, Wreck of a, 386
CABLES, Interruptions to:—
Cantyre (Scotland) Island of Islay, 70
Dartmouth-Guernsey and Guernsey-Alderney, 70
Lizard-Bilbao, 70
String Sound, 139
CABLES, NEW:—
American, 70
England and Ireland, 315
Transatlantic, 501
CABLES, REPAIRS OF:—
Bushire-Jask, 276
Dublin, 315
Marseilles and Barcelona, 34
Odessa and Constantinople, 251
Between Zanzibar and Mozambique, 423
Callender's Bitumen Core, 422
Candle, M. Morin's solenoid, 468
Charing Cross and Waterloo Electric Railway, 290
Charing Cross and Waterloo Electric Railway Bill, 169, 381
Chemistry of Storage Batteries, Contributions to the, by E. Frankland, D.C.L., F.R.S., 261
Circuit, The direct and derived field-magnet, in the dynamo, 471

CITY NOTES (Meetings and Reports of Electric Light, Telegraph, and Telephone Companies, &c.):—
Albo-Carbon Light Company, 126
Anglo-American Brush Electric Light Corporation, 59, 77, 103, 104, 125, 146
" " Telegraph Company, 148, 318
" " Electric Light Company, 423
Anglo-Spanish (Brush) Electric Light and Power Company, 276
Australasian Electric Light, Power, and Storage Company, 406
Brazilian Submarine Telegraph Company, 236, 361, 403, 478
British Insulite Company, 123, 148
Brush Midland Electric Light and Power Company, 276
Consolidated Telephone Construction and Maintenance Company, 456
Cuba and Submarine Telegraph Company, 77, 103, 126
Devon and Cornwall Electric Light and Power Company, 39
Direct Spanish Telegraph Company, 276, 295, 296
Direct United States Cable Company, 125, 144, 342
Eastern Extension, Australasia, and China Telegraph Company, 126, 296, 318, 341, 522
" Telegraph Company, 75, 82, 126, 256, 318, 522
Electric Light Contract and Maintenance Company, 406
" "Sun" Lamp and Power Company, 438
Electrical Power Storage Company, 254, 318
Electro Amalgamator Company, 101
Faure Electric Accumulator Company, 459, 540
German Norwegian Submarine Cable Company, 256
" Union Telegraph Trust Company, 256
Globe Telegraph and Trust Company, 296
Great Northern Telegraph Company, 126, 342, 403, 522
" Western Electric Light and Power Company, 148, 214, 276, 342, 426, 460
Hamburg-Heligoland Telegraph Company, 256
Hammond Electric Light and Power Supply Company, 404
India-Rubber, Gutta-Percha, and Telegraph Works Company, 125, 147

CITY NOTES—*continued.*
Indo-European Telegraph Company, 293, 318, 340, 385, 406
London Platino-Brazilian Telegraph Company, 192, 457
Long-Distance Telephone Company, 406
Maxim-Weston Electric Company, 276, 340, 361, 401, 440
Mediterranean Extension Telegraph Company, 192, 212
Montevedian and Brazilian Telegraph Company, 296
National Telephone Company, 214
Oriental Telephone Company, 79, 148, 342, 426, 458
Phœnix Electric Light and Power Company, 37, 60, 76
Provincial (Brush) Electric Light and Power Company, 275
Railway and Electric Appliances Company, 81
Reuter's Telegram Company, 364
Scandinavian Electric Company, 522
Submarine Cables Trust, 426, 459
" Telegraph Company between Great Britain and the Continent of Europe, 169
" Telegraph Company between France and England, 192
Telegraph Construction and Maintenance Company, 124, 148, 191
Telephone Company, 101
" " of Ireland, 403
Waterloo Electric Railway Company, 296
West Coast of America Telegraph Company, 256, 541
" India and Panama Telegraph Company, 406, 426, 437
Western Union Telegraph Company, 192, 296, 541
" and Brazilian Telegraph Company, 39, 73, 214, 236
Yorkshire (Brush) Electric Light and Power Company, 80
Communication between ship and shore, 422
Companies, New American, 367
" Official Returns of, 19, 56, 72, 120, 140, 160, 188, 233, 291, 315, 337, 381, 399, 423, 437, 456, 502, 539
" Registration of, 19, 56, 98, 120, 208, 234, 273, 291, 336, 361, 381, 423, 437, 478, 522, 540
Compass deviation, Correcting, 520

CORRESPONDENCE—
Ayrton and Perry's motor, by Oliver J. Lodge, 484
Batteries, Secondary, *v.* primary for temporary electric light installations, by G. Bingswanger, 484
Bell telephone, Who is the true inventor of the? by W. C. Barney, 28, 59
Cable companies, Why, don't pay, by "Argentina," 485
Callender's Vulcanised Bitumen Core, by Basil Gee, 136
Carbon rods, Zinc-coated, for electric lighting, by A. J. Jarman, 544
City Guilds of London electrical engineering classes, by "E. M.," 248, 269
Combined resistance, by Joseph Brearley, 268
Correction, by Benjamin Verity & Sons, 416
" By W. Kurtz, 464
" " Fred. M. Brockelbank, 243
" " H. Bury, 95
" " Gisbert Kapp, 95
Duplex, by W. Moon, 333

CORRESPONDENCE—*continued*
Dynamo-electric machine patents, by "Chick," 465
,, ,, ,, By A. E. Conti, 417
,, by "Inquirer," 377
Dynamo-electric machines, by "Inquirer," 29
,, ,, Rankin Kennedy, 202
,, ,, Francis J. Mudford, 65, 94, 136
Dynamos, Unipolar, by Rankin Kennedy, 288
,, ,, ,, E. L. Voice, 288
Earth currents, by E. O. Walker, 466
Edison Indian and Colonial Electric Company, by "Inquirer," 395
Electric accumulators, by "E.," 65, 94
,, ,, By T. Marshall Collet, 116
,, ,, ,, A. Reckenzaun, 14
Electric currents, Transformation of, in secondary generators, by Rankin Kennedy, 506
,, transportation of force, A new theory of the, 14
,, launches, by E. Toynbee, 526
,, light, by "Fareham," 93
,, ,, companies and their management, by "One of the Workmen subject to the above order," 287
,, ,, conductors, by W. Kingsland, 116
,, ,, By Fred. Ormiston, 202
,, ,, ,, "P. C.," 166
,, ,, ,, Henry M. Sayers, 201
,, ,, ,, Jas. Swinburne,
,, ,, Gauge for, by M. Volk, 249
,, ,, fittings, by "J. B. V.," 94
,, ,, leads, by "E.," 247, 269
Electric lighting, by "Electron," 29
,, ,, ,, E. W. Beckingsale, 29, 50
,, ,, ,, "Your Communicator," 286
,, ,, ,, "Your Correspondent," 201
,, ,, ,, J. E. Jackson, 185, 248
,, ,, ,, Charles Lever, 484
,, ,, in Sheffield, by "Theoretical Cost," 115
,, ,, Act, by E. W. Beckingsale, 116, 166
,, ,, ,, by "E.," 135
,, ,, ,, by "Simplex," 94, 134
,, ,, ,, by James Swinburne, 203
,, ,, Cost of, by Samuel Purnell, 166
,, ,, and inherent difficulties, by A. E. Conti, 312
,, ,, The prospects of, by "A Constant Reader," 446
,, ,, The prospects of, by A. J. Jarman, 312, 454
,, ,, The prospects of, by W. Kingsland, A.S.T.E., 333, 395
Electrical accumulators, by J. M. Collet, 418
,, ,, by Geo. Forbes, 249
,, distribution, by L. Gaulard and E. Dixon Gibbs, 397, 418
,, energy, The industrial unit of, by James Swinburne, 203
,, energy, The industrial unit of, by Fredk. H. Varley, 185
,, exhibitions, by "An Electric Spark," 418
,, instruction, by Desmond G. Fitzgerald, 15
,, instruction, by E. C. Rimmington, 29
,, measurements, by J. J. Fahie, 203, 418
,, measurements, by Samuel Purnell, 185
,, measurements, by H. D. Wilkinson, 486
,, meters, by A. E. Conti, 271
,, microphones, Metallic, by W. C. Barney, 269
,, testing, by Samuel Purnell, 378
,, work in America, 394
Electricians, Ablest, living to-day, by "Not One of the ablest," 485

CORRESPONDENCE—*continued.*
Electro-magnets, On winding, by W. C. Barney, 525
Electro-magnets, On winding, by "Cacarucas," 543
Electro-motors, by Ayrton and Perry, 444, 544
,, ,, ,, C. R. Heap, 466, 525
,, ,, ,, Moritz Immisch, 14, 49, 65
,, ,, ,, F. M. Newton, 28
,, ,, ,, Silvanus P. Thompson, 49
Elphinstone-Vincent machine, by Francis J. Mudford, 167
,, By Chas. W. Vincent, 135
Floundering into failure, by "L. H.," 331
Galvanometer, An improved Thomson reflecting, by Francis J. Mudford, 27
Gardner *v.* Maxim-Weston Electric Company, by Jas. Gardner, 136
Gardner *v.* Maxim-Weston Electric Company, by H. Watt, 116
Generators, Secondary, by Lucien Gaulard and J. Dixon Gibbs, 526
,, By Rankin Kennedy, 486, 543
,, By E. L. Voice, 464
Incandescence lamps, by "Continuous Currents," 466, 483
Incandescence lamps, Tests of, by Arthur Shippey, 544
Incandescent lamps, Tests of, by Henry F. Joel, 416, 484
Incandescent lamps, Tests of, by Fredk. H. Varley, 446
Induction, Neutralising, by A. E. Conti, 185
Information required, by Collette, 313
Industrial unit of electrical energy, by James Swinburne, 135, 248
Industrial unit of electrical energy, by Frederick H. Varley, 225
Insulating electric light leads, by Francis A. Pocock, M.E., 355
Inventors and inventions, by C. Scott Snell, 14
Iron disc, The, used by De la Rive in his researches in "Vibratory movements of electrical currents," by Frederick John Smith, 287
Kempe's Handbook of Electrical Testing, by "Fareham," 525
Long-Distance Telephone Company, by "Common Sense," 416
Long distance telephoning, by W. C. Barney, 356, 417, 446, 465
,, ,, By "Bertie," 377
,, ,, ,, Eds. Elec. Rev., 378
Maxim-Weston Electric Light Company, By F. W. Landon, 486
By H. Watt, 526
Microphones, Metal, by A. E. Conti, 419
,, ,, ,, J. Munro, 445
,, ,, ,, R. and M. Theiler, 418, 485
Patent rights, by "Magnet," 287
Permanent magnets *v.* Electro-magnets, by "Permanent Magnet," 416
Physical Society, by Fred. Guthrie, 394
Professional men, by E. Van Heuten, 445
Pronunciation of "dynamo," by "W.," 225
,, ,, By D-n-mo," 248
Reporters not admitted, by Walter Dunlop, 49
Reviews, by James Grundy, 48
Society of Telegraph Engineers and of Electricians, by "Fareham," 95
Society of Telegraph Engineers and of Electricians, by A. J. Frost, 14
Society of Telegraph Engineers and of Electricians, by J. Munro, 395
Sounds caused by electricity, by A. E. Conti, 506
Sounds produced by a plate pressed against the ear, by E. Berliner, 466
Telegraph lines, Looped, by J. F. Fahie, 248
,, rates to South America, by "Argentina," 445
Telegraphs, The State purchase of the, by J. Fraser, 28
Telegraphy, Atlantic submarine, by "D.," 506
Telephone, The, by "Common Sense," 331, 393
,, ,, ,, José D. Husbands, 377
,, ,, ,, "Return Circuit," 269
,, ,, ,, "Das Telephon," 248, 286

CORRESPONDENCE—*continued.*
Telephone, The, by "T. W. G.," 486
,, The Court of Appeal and the first inventor of the, by W. C. Barney, 270
Telephonic utility, by "H. R. J.," 225
Transmission of power to great distances, by W. Moon, 445
Trouvé's bichromate of potash batteries, by G. Trouvé, 394
Working by the electric light, by "A. J. F.," 377
Copper wires, Table showing the relative dimensions, lengths, resistances, and weights of pure, 308
Core, Callender's Patent Vulcanised Bitumen, 110
Costs, Relative, of street lighting by electricity and gas in New York, 328
Crystal Palace Electrical Exhibition, 272, 309, 359, 502
Current breaker, A sparkless, 262
,, measurer, 358

DANGER, Another new, 207
Distribution of the galvanic current in conductors, 224
Duplex Electric Light Company, 518

EDISON ELECTRIC ILLUMINATING COMPANY of Boston, 313
,, Electric Illuminating Company of Danville, 313
,, Electric Light Company, 96, 168, 187, 205
Electric bell and battery combination, 477
,, ,, Gent's patent suspension, 32
,, Carbon Company, 169, 215
,, ,, Storage and Apparatus Manufacturing Company of Scotland, 168, 205, 249
,, dynamograph, or apparatus registering the work of machines, 427
,, fire alarm for the London streets, 336
,, Gas, and Engineering Exhibition, 205
,, Light, Storage, and Engineering Company, Wolverhampton, 204
,, Light Syndicate Company, 398
,, locomotion, Prof. Ayrton on, 139
,, ,, Limitation of speed, 497
,, Motor Syndicate, 380
,, potential in batteries, 153
,, ,, energy and work, 410
,, photophone, Frontal, 378
,, railway, Edison, 194
,, railway extension, 139
,, railway, Portrush, 422
,, ,, Thames, Proposed, 436
,, resistance of glass, Influence of temperature upon the, 455
,, ,, of glass at low temperature, 54
,, signalling bell, Zadig's, 281
,, spark, On the, 34
,, tramway, The Giant Causeway, 97
,, wires, and the saving of life, 137

ELECTRIC LIGHT:—
Aberdeen Town Council and the, 476
at Bath, 187
Bermondsey Vestry and the, 96
in Bombay, 421
Brush, at Aberdeen, 18
Camberwell Vestry and the, 476
Cavities, Illumination of, by the, 96
Croydon Town Council and the, 537
Greenock Town Council and the 518
Chelsea Vestry and the, 137, 187, 271
Chester Town Council and the, 51
Clerkenwell Vestry and the, 69
companies of America, 327
Dalkeith Police Commissioners and the, 138
Dentistry and the, 233
Devon and Cornwall, and Power Company, 62
disclosures, 472
in dress, ball room, 51
at Dublin, 434
Dublin, Company, 69
Dundee Gas Commissioners and the, 272
Edison Company and the Incandescent, 17
in Egypt, 137
experiments on plants, 187
Fishing with the, 536
Forres Town Council and the, 51
at the General Post-office, 272

ELECTRIC LIGHT—*continued.*
Glasgow Town Council and the, 397
Greenock Town Council and the, 518
at Hackney Wick, 452
in the Home, 487
in our Homes (lecture), 358
at the Hungarian court, 51
installations for offices, 389
and the International Fisheries Exhibition, 205, 232
Kensington Vestry and the, 96
at Kirkcaldy, 451
Kirkcaldy Town Council and the, 138
at Lambeth, 314
Lambeth Vestry and the, 187
at Liverpool, 434
Marylebone Vestry and the, 232
at Midland Railway Company's telegraph stores and workshops, Derby, 3
Montrose Town Council and the, 31
New England Manufacturers' Association and the, 95
in Newington, 500
Newington ratepayers and the, 187 204
Newington Vestry and the, 136, 187, 397, 476
at the New Law Courts, 232
at the Oxford Union Society, 204, 271, 310
in Paris, 137, 187
Parliament and the, 421
and photography, 52
Rotherhithe Vestry and the, 136
St. George's Vestry and the, 313, 433
St. Olave board of works and the, 69
St. Saviour's board of works and the, 69
at a Vienna hospital, 334
Wandsworth board of works and the,

ELECTRIC LIGHTING:—
at Aberdeen, 289, 313, 378, 397, 421
of *Aberdeen Journal* office, 451
Act, 1, 41, 83, 105, 118, 127, 149, 171, 196
Admiralty and, 475
of the Australian Government printing office, 517
at the Belgium Chamber of Representatives, 116
of the Berlin Academy of Painting and Sculpture, 334
Bills, 500
Birmingham Corporation and, 434
Board of Trade and, 168
Board of Trade, provisional order, 271, 272
Books on, 521
in Boston, 378
in Boulton, 69
of the Brighton Royal Pavilion Banqueting-room, 289
of Brooklyn Bridge, 452, 477, 518
of Broughty Ferry, 232
Broughty Ferry Commissioners and, 31, 138, 232
Brush, System of, 31
at Buenos Ayres, 452
Camberwell Vestry and, 31, 167
Cardiff, 30, 69
Chamberlain, Mr., and, 237
of Chelsea, 116
of Chesterfield, 398
of Colchester, 358
Commission of Sewers and, 31, 53, 249, 289
companies generally, 378
companies and the Board of Trade, 357
competition, 168
Cost of, 378
of Croydon, 433
Croydon Local Board and, 434
of the *Daily Telegraph* offices, 452
Development of, 530
of Dewsbury and District Infirmary Exhibition, 334
Domestic lecture on, by Prof. S. P. Thompson, 52
at Dublin, 30
of Dundee, 117
Dynamo axis for, on board ship, 232
of Edinburgh, 452
of Edinburgh Royal Lyceum Theatre, 232
,, Waverley Railway Station, 187
by Edmunson, J., & Co., 250
Estimates, 473
On experiments in, in the streets of Berlin, 5, 22
Fire risks from, 358
of forges and workshops at St. Denis, 46
of Fulham, 434
of Glasgow Caledonian Central Station Hotel, 518

ELECTRIC LIGHTING—*continued.*
of Gloucester County Lunatic Asylum, 477
of the Gaiety Theatre, 204, 452
of gold mines at Melbourne, 334
of Holborn Viaduct, 537
of houses, 510
Hammond Electric Light Company and town, 17
of H.M.S. *Rainbow*, 314
of Holborn Viaduct, 167
at the House of Commons, 192, 249, 289, 313, 333
of the *Irish Times* office, 397
Jarman's, A. J., invention for, 536
Johnson, Edward H., On, 313
at Kimberley, 334
of the Kremlin, Moscow, 168, 313, 334
at Moscow, 435, 538
Leeds Corporation and, 232, 379, 435, 451
and locomotion, 158, 226
of London and suburbs, 249
of the Manchester Theatre Royal, 69
of Mexico, 378
Metropolitan Board of Works and the, Act, 95
at Nantua (Ain), 246
of New York, 379, 476
Newington Vestry and the, Act, 96
at Norwich, 358
of Nottingham, 390
of Parkeston Harbour, 204
at Pentonville Road, 250
of Perth Dye Works, 117
of the Reform Club, 434
Report on, 86
of St. Giles's District, 452
St. Martin's-in-the-Fields and the, Act, 96
of salt mines, 358
of San Francisco, 500
of the Savoy Theatre, 333
Sheffield Town Council and, 30, 51
in South Wales, 30
Street, at Seegedin, Hungary, 137
at Sunderland, 167
superintendent, Appointment of, 273
system, Thomson-Houston, 258
systems, 428
of a theatrical ballet, 69
of trains, 116
and the transmission of power, 251
of Vienna, 271
of a Vienna infirmary, 232
of the Vienna Grand Opera stage, 421
by water-power (award), 138
of Wolverhampton, 500
for workshops and large spaces, 155, 172

ELECTRICAL—
advertising, 64
appliances on the Great Western Railway, 18
communication, The Van Rysselberghe system of, 281
Directory and Advertiser, 139
discovery, The latest, 54
Distribution, 324
Engineering at Massachusetts, 111
laboratory and workshops, 89
measurement, New apparatus for, 64
power, 399
prize essay, 98
progress, 70
railway company, 437
,, in Ireland, 53
,, signalling, 354
,, in Vienna, 376
,, at Wimbledon annual rifle meeting, 399
resistance of carbon contacts, 129
,, of the human body, 508
,, Measuring, with a constant current, 217
science, Lectures on, 154, 198, 206, 207, 242, 301, 367, 409
testing, Portable, apparatus, 422
tramcar, New, 244
transmission of power, 448, 467
transport of power, by Dr. O. Fröhlich, 217, 240, 260
work, Screw gauges for, 3
Electricians, French, 273
Electricians *v.* gas manufacturers, 521

ELECTRICITY—
Advance of, 48
Applications of, 215
Application of, to medical purposes, 507
,, to motive-power, 474
and fire damp, 115
Future prospects of, 380
v. gas, 21, 69
v. hangings, 97

ELECTRICITY—*continued.*
Lecture on, 71, 167
Measurement of, 304, 319
Misdeeds of, 139
as a motive-power, 412, 433, 449
for tramways, 336
Transmission of power by, 322, 345
Electrolysis of binary and various other acids and saline compounds with electrodes of carbon, 456
Electro-magnets, On winding, 488
Electro-motors, 407
,, ,, On the residual current of weak, and the constitution of electrolytes, 454
Electrodes, On the deformation of polarised, 498
Electrodes, On the unequal heating of, by the electric discharge, 310
Electrometer, Minchin's absolute sine, 423
Engine, Robey & Co.'s, at the Brussells House of Parliament, 137
Engines, Electric lighting, 500
Examinations, Science class, 427, 487
Experiments at Miesbach-Munich, 106

FAURE-SELLON-VOLCKMAR Accumulators, 538
Fisheries Exhibition, International, 373, 452, 538
Floundering into failure, 193
Force: its origin and the philosophy of its development, 7
Friction clutch, Hall's reliable, 322

GALVANOMETER or ampère meter, Prof. Blyth's solenoid, 373
Galvanometer, Obach's, Dr. Eugen, improved, 528
Gardner *v.* Maxim-Weston Electric Light Company, 93
Gas-engines and the electric light, 91
,, *v.* the electric light, 91
,, *v.* electricity, 139, 501
,, lighting, Bray's system of, 197
General Post-office Telegraph Department, 398
Generators, Secondary, 467
Glass blower, Wright and Mackie's mechanical, 183
Glover, W. T., & Co., 71
Gramme Electrical Company, 522
Gramme ring, An explanation of the, 494
Great Western Electric Light and Power Company, 232
Guild *v.* Hope and the Scottish Brush Electric Light and Power Company, 206, 251

HEAT developed by a current during its variable state, 158
Huddersfield Technical Schools Exhibition, 520

INDUCED currents from the reciprocal movements of two magnetic bodies, by M. Th. Du Moncel, 197
Induction between telegraph and telephone line-wires, Cotti's system for neutralising the effect of, 164
Induction Spark, On the thermic phenomena of the, 55
Insulating, Non-conductive, solids, and liquids, 55
Insulation for electrical conductors, Temple's patent slate, 113
Insulator, Bennett's, 112
Inventors and inventions, 470

JABLOCHKOFF Electric Light and Power Company, 421
Jamieson, the late Dr. Fife, Memorial to, 30
Jay-Gould's Western Union Telegraph Company, Action against, 33
,, ,, yacht, 336

KIRKCALDY Electrical Exhibition, 380

LAMP, Arc electric
,, ,, ,, Fyfe-Main, 232, 379
,, ,, ,, Lea's, 24
,, ,, ,, Lever's, 12
Lamps, electric, Incandescence, 200, 380, 435
,, ,, incandescence, "Cruto," 536
,, ,, incandescence, Fittings for, 32
,, ,, incandescence, Tests of, 512
,, ,, Incandescent, for steamships, 136

Lamps, electric Manufacture of, 431
,, ,, Miners', 204
,, ,, Stevenson's, Nathaniel, 205
,, ,, "Sun," The, 31
,, ,, Throat, 118
,, ,, Tihon and Rézard's, 305
Leads, Electric light, 9, 264, 372
Legal warfare, 168
Letters patent for inventions, Amendment of law relating to, 277, 297, 334
Lubricator for the commutators of dynamos, 169

MACHINE, DYNAMO-ELECTRIC—
Ball's "Unipoplar," 265, 283, 501
Edison, Trial of new, 435
Elphinstone-Vincent, 45, 118, 187, 272
Lumley, 199
Machines, Dynamo-electric, 118
Experiments on, 507
On the mode of working, 26, 61
On prejudicial actions in, 366
On testing, 90
Machines, Electro-magnetic, On the theory of, 360
Machines, Magneto-electric, and dynamo-electric, 139
Magnetism, Theory of, 112, 140
Magnets, The carrying power of, 536
Manchester Electrical and Engineering Exhibition, 359
Mathematical prize, The great, 336
Maxim's, Mr., desperate encounter with a thief, 500
Maxim-Weston Electric Company, 500
,, ,, Light and Power, Company, 232, 289
Meters for power and electricity, 237
Metropolitan Electric Light Company *v.* Cruikshank, 168
Microphone, The, 454
,, Action of the, by A. Stroh, 221
,, Influence of surface condensed gas on the action of the, 328
,, Theory of the action of the carbon, What is it? 306
,, A vacuum, 477
Microphones, Metallic, 436
Microphonic experiments, Mr. Stroh's, 350
Mining lamp, Premium for a patent safety, 71, 379
Molecular rigidity of tempered steel, 132
Motive-power by alternating currents, 336
Motor, The Daft, 321
,, Esteve's, 451
,, Toynbee's electro-magnetic, 516
Motors and batteries, Light, 62

NEGLECTED SOURCE OF REVENUE, 169
New names for old friends, 30
Northern Electric Light, Power, and Appliances Company, 188

OBITUARY:—
Carmichael, Sir James, 479, 499
Cherry, William, 359
Jewell, The Hon. Marshall, 197
Sabine, General Sir Edward, R.A., K.C.B., 539
Sawyer, Wm. E., 453
Spottiswoode, W., F.R.S., 539
Walker, C. V., F.R.S., 16
Ohm, Electrodynamic method for the determination of the, 455
Ohm's law, 195
Ollendorf *v.* The Metropolitan Electric Light and Power Company, 123

PATENT BILL, The Government, 365, 389, 399
,, laws, Amendment of the, 250

PATENTS—
New, 35, 56, 99, 140, 189, 209, 292, 316, 337, 382, 400, 441, 460, 503, 523
for Inventions Bills, 1883, 360, 453
Philadelphia Electric Exhibition, 168
Philippart, M. Simon, 335, 422, 478
Phœnix Electric Light and Power Company, 116
Pneumatic tube despatch, 200
Post-office, The, and inventors, 407
Presentation, 71, 314
Professional men, 388

QUEENSLAND Post and Telegraph, 169

RE-ACTIVE FORCES, Method of measuring, 56
Resistance of liquids, 55
,, ,, mercury, 55
,, with spiral cords of wire, 388
,, of water, 490
Reviewers reviewed, 398
Royal Aquarium Electric Light Exhibition, 118, 167, 205, 257, 285

REVIEWS:—
Electrical lighting arrangements, with special reference to their practical execution, by Dr. Alfred Von Urbanitzky, 374
Formulaire pratique de l'Electricien, par E. Hospitalier, 430
Galvanic batteries, accumulators, and thermo batteries; a description of the hydro and thermo electric sources of currents, with particular reference to practical requirements, by W. Ph. Hauck, 348
Directory and Advertiser, Berly's British, American, and Continental Electrical, 163
Electric light popularly explained, by A. Bromley Holmes, 108
Electrical transfer of power, and its application in practice, with special reference to the conduction and distribution of the electric current, by Eduard Japing, 284
Electricity, Dictionary of, or the Electrician's handbook of reference, &c., by Henry Greer, 27
Electro-magnets, Elements of construction for, by Count Th. Du Moncel, 224
Electro-motors: a treatise on the means and apparatus employed in the transmission of electrical energy, and its conversion into motive-power; for the use of engineers and others, by J. W. Urquhart, 224
Practical electric lighting, by A. Bromley Holmes, 512
Rules, Useful, and tables relating to mensuration, engineering, structures, and machines, by W. J. Macquorn Rankine, 12
Tralado de Telegrafia, par Don Antonino Suarez Saavedra, 165

SIGNALLING in Mines, 436
Sparks, The displacements and deformations of, by electrostatic actions, 307
Sperry Electric Light Motor and Car Brake Company, Chicago, 167
Storage batteries, 398
Submarine cable maps, 360
Swan United Electric Light Company and the Russian Government, 187

SOCIETIES:—
Electrical, New York, Society, 521
Engineers, Institution of, and shipbuilders in Scotland, 69
Engineers, South Wales, Institute of, 250
Physical Society, 85, 182, 224, 375, 415, 483, 505, 542
Royal Society of Edinburgh, 33, 54, 251, 302, 335
Royal Society of Arts, Edinburgh, 206, 233, 271, 309
Telegraph Engineers, Society of, and of Electricians, 66, 85, 97, 134, 181, 183, 222, 329, 335, 376, 381, 413, 323, 462, 480

TECHNICAL EDUCATION, Royal Commission on, 282
Telegrams, press, The Indian Government and, 315
,, ,, Suppression of, 139
,, Railway, 520
,, Sixpenny, 291, 298, 334, 380

TELEGRAPH—
automatic, The Wheatstone, 453
Bill, New, for the regulation of telegraph and cable companies in the United States of America, 18
Clerks' Agitation, 150, 207
,, Female, and Sunday Duty, 423

TELEGRAPH—*continued.*
code, Globe, 454
Conference, International, 96
Construction and Maintenance Company, 358
Construction and Maintenance Company's Works, 68
Convention, The, 501
Experiments on a looped, line, 216
extension, 436
extension, Asian, 251
,, in Shetland, 453
inspector killed, 54
lines, China, 521
lines interrupted, 233
lines, Terrestrial currents along, 521
offices, All night opening of, 334
poles, Durance of, 334
service revenue, 315
ship, Accident to a, 206
,, Launch of a, 169
in Siam, 315
Shetland, Association, 519
steamer, *Professor Morse*, 119
type printing, Knudson's, 151, 181
for the west side of Shetland, 19
wires across streets, 207
,, Assessing, 206
,, Overhead and underground, in Chicago, 272
,, underground, How to get, 119
,, ,, in Chicago, 207
,, ,, in New York, 216

TELEGRAPHIC—
apparatus, 516
communication with Bokhara, 398
,, ,, Ireland, 399
,, ,, lighthouses, 207
extension, 233
International, convention, 315
messages, 53
Scotch fishing stations, extensions, 520
Shetland, communication interrupted, 70
,, extension, 119

TELEGRAPHS—
of the ancients, 263
in France,
Post-office, 273
in Siam, 96
Underground, 454

TELEGRAPHY—
Atlantic submarine, 498
Automatic, 70
and Electrical Engineering, School of, 264

TELEPHONE—
The, 387
The, and the speaking telephone as a scientific invention, and its commercial position, 1
in Aberdeen, 96
Aberdeen, Company, Proposed, 138
in America, 501
American, Another, company, 519
,, New, 519
in Brooklyn, 378
The Broughty Ferry Commissioners and the, 314
Camberwell Vestry and the, 314
in Cincinnati, 334
Commercial position of the, 177
companies, Profits of, 336
,, Rival, 423, 436, 454
and the coronation of the Czar, 314
in Dundee, 139, 188, 206, 251, 501
experiments, 290
factories in the United States, 502
The first, 492
in France, 291, 314, 390
in Holland, 381
in India, 53
in Italy, 118
London and Globe, Company, 381
Long-distance, 519
Long-distance, Company, 381
patents, 519
The problem of the, 171
in Providence, 334
for railway purposes, 33
rates in Scotland, 314
relay and loud-talking receiver, 314
Rival, companies, 386
and signal stations, 359
signals, Individual, 491
transmitters, 428
in the United States, 96

TELEPHONE—*continued.*
American Bell, Company *v.* Amos E. Dolbear, *et al.*, 195
London and Globe, Company *v.* The United Telephone Company, 71, 119, 171
United, Company *v.* Dale, 72, 119
United, Company *v.* Harrison, Cox-Walker and Company, 71, 92, 113, 139
,, ,, *v.* Hebden, 170, 233, 246
,, ,, *v.* The London and Globe Telephone and Maintenance Company, 420, 521
,, ,, *v.* The Long-Distance Telephone Company, 420, 453

TELEPHONIC—
apparatus, Husband's, 108
Bennett's, translators, 21
Blackburn, exchange, 249
communication, 272, 278
,, in Belgium, 519
,, between Edinburgh and Glasgow, 206, 251
,, in the City, 381
,, ,, Lambeth, 399
,, between Lundy Island and the mainland, 119

TELEPHONIC—*continued.*
,, between New York and Chicago, 334, 360
,, between Parliament and the Exchange, 206
,, Wolverhampton Chamber of Commerce and, 314
Telephony in Paris, 206
Thomson-Houston Electric Company, 422
Thunderstorms, 521
Transmission of energy by batteries of electrical apparatus, 392
,, mechanical work by electric currents, 415
,, power, 359
,, ,, experiments at the Chemin de Fer du Nord, 352
,, ,, to a long distance, 117, 128, 148, 216
Transmitter, The Baxter, 314
,, The Edison duplex, 491
Turbine, Hett's patent Trent, 529

UNIVERSAL Electric Appliances Company, 206
Universal Electric Light Company, 476

VERITY *v.* the J. B. Roger's Company, 98
Vienna International Electrical Exhibition, 43, 118, 168, 207, 233, 272, 315, 334, 335, 359, 369, 421, 501
Volta prize, 206
Volt-Ampère or Watt, 205

WARNING, A timely, 452
Western Counties Electrical Exhibition, 422
,, Edison Light Company, 313
,, Electric Company, 502
,, Union and Mutual Union, Rumoured consolidation of, 154
What they will do with it, 319
Whorlow *v.* Devon and Cornwall Electric Lighting and Power Company, 357
Wires, Overhead, 359, 399, 453, 497, 519
,, overhead, Sir Chas. Dilke and, 538
,, Underground, 334, 501
,, ,, Paper conduits for, 521
,, ,, Conflicting opinions on, 500
Wright and Mackie's mechanical glass blower, 44

YORKSHIRE Brush Electric Light Company, 95

INDEX—SPECIFICATIONS.

1882.

ADIE, P., and SIMPSON, W. S. (3912), 338
Akester, W. H. (1642), 56; (2419), 57; (2519), 72
Alabaster, H., Gatehouse, T. E., and Kempe, H. R. (2675) 121
Alabaster, H., and Gatehouse, T. E. (5166), 542
Alabaster, H., and Gatehouse, T. E. (5167), 542
Allen, P. R. (4084), 383
Allman, J. (4911. Communicated by L. E. Schwerd and L. Scharnweber, both of Germany), 505
Allport, C. J. (2192), 56
,, ,, and Punshon, R. (3971), 349
Anders, G. L. (4110), 383; (5001), 541
Anderson, Sir Jas., and Johnson, W. C. (2311), 36
Andre, G. G. (2432), 58
Andrews, J. D. F. (3393), 252; (4511), 443; (5158), 525
Aron, H. (2943), 144
Ayrton, W. E. (3036), 190
Ayrton, W. E.. and Perry, J. (2613), 99; (2642), 120; (3380), 252; (4532), 443

BAILEY, M. (5023), 523
Barker, R. (4547), 460
Barlow, J. (3570), 254
Barlow, W. A. (3476. Communicated by L. Encausse, of Paris), 253
,, ,, (4299. Communicated by Messrs. L. Encausse and Canesie, of Paris), 385
Barnet, H. T. (3964), 340
Barrier, J. J., and Tourvielle de Lavernede, F. (2425), 58; (3763), 294
Bayley, G. W. (4829), 504
Beckingsale, E. W. (2532), 72; (2512), 346
Beeman, J. S. (3279), 234; (3349), 234; (3350), 234; (3351), 234; (3455), 253.
Beeman, J. S., Taylor, W., and King, F. (3812), 337; (3813), 337; (4503), 442; (4504), 443; (4680), 462
Benson, M. (4740. Communicated by J. P. Stabler, of North America), 479
Betbeder, F. (3061. Communicated by Eugène Bourse, of Rochefort-sur-Mer), 190
Bidwell, Shelford (3513), 274
Binks, H. (3073), 190
Bishop, L. R. (4235), 541
Blanchard, V. W. (5695), 295; (5850), 295
Blechynden, A. (4260), 384
Blyth, J. (2661), 121
Bolton, E. J. (3592), 275
Boult, A. J. (5673. Communicated by R. S. Waring, of America), 275
Boys, C. V. (3434), 274
Brailsford, T. R. (4286), 384
Brain, W. B. (2659), 121
Brandon, R. H. (3982. Communicated by H. W. Southworth, of America), 295
Brear, S., and Hudson, A. (4412), 424
Brewer, E. G. (3700. Communicated by Otto Shulz, of Strasburg), 275
,, ,, (3713). Communicated by the Société anonyme des ateliers de construction mécanique et d'appareils électriques of Paris), 293
Bright, Sir C. T. (2602), 73
Brockie, J. (2370), 37; (4119), 424
Brown, A. C., and Saunders, H. A. C. (4121), 425
Buell, C. E. (3528), 274
Burr, E. B., and Scott, W. T. (4198), 384

CAMPBELL, L. (3582), 274; (5014), 505
Cardew, P. (5105), 524
Carter, B. J. (4527. Communicated by G. M'Kendree Guerrant, of America), 443
Carus-Wilson, C. A. (2954), 144; (3466), 253
Cathcart, C. H. (3107), 191
Chadburn, W. (2755), 122
Chameroy, B. H. (2295), 56; (3946), 338
Chaster, J. E. (3458), 274
Cheesbrough, F. J. (4316. Communicated by A. K. Eaton, of America), 385; (4317), 400
Clark, A. M. (2676. Communicated by J. M. A. Gérard-Lescuyer, of Paris), 121
,, ,, (3508. Communicated by H. J. Muller and A. Levett, both of America), 254
,, ,, (3824. Communicated by L. Hours-Humbert and J. de Brancion de Leman, of France), 337
,, ,, (4149. Communicated by H. G. Fiske, of America), 384
,, ,, (3296. Communicated by Gaston Planté, of Paris), 424
,, ,, (4880. Communicated by W. S. Parker, of America), 504
Clark, W. (4599. Communicated by Nicolas de Kabath, of Paris), 461
Cookson, N. C. (3941), 338; (4391), 424
Courteney, R. H. (3101), 191
Cowan, J. (3681), 275
Cowan, T. W. (4915), 505
Coyle, B. (2397), 57
Crompton, R. E. B. (2618), 100; (2619), 100; (3339), 234
Crompton, R. E. B., and Kapp, G. (4810), 503
Crookes, W. (4238), 384
Crowder, J. (4429), 425
Cumine, J. A. (2318), 36
Currie, S. C. C. (3712), 293
Cuttriss, T. (3665. Partly communicated by C. Cuttriss, of America), 275

DAVIES, J. H. (3120), 190
Debenham, W. E. (3010), 189
Defries, C. (2335), 36
Defty, H. (2628), 101
Deprez, M. (4376), 401
Desfossés, E. (3869), 337
D'Humy, P. R. de Fancheux (3666), 293 (4883), 505; (5108), 524
Donnithorne, T. (4250), 384
D'Oreli (3504), 254
Durham, F. W. (4254), 384
Durham, F. W., and Ward, P. (3303), 235

EDWARDS, E. (3370. Communicated by B. Carré, of France), 235
Edwards, E., and St. George, A. F. (4695), 479
Edwards, E., St. George, A. F., and Phillips, H. L. (4694), 479
Edwards, G. M. (3691), 293
Ellery, H. G., and Gent, J. T. (5126), 524
Elliott, A. C. (4928), 505
Emmens, S. H. (2348), 36; (2349), 36; (2912), 143; (2913), 143; (2914), 143; (3825), 337; (4080), 383; (4147), 383
Emmens, S. H., and Mason, S. (4431), 425
Epstein, L. (2807), 142; (3770), 294
Espent, W. B. (4036), 340

FAIRFAX, J. S. (3273), 234; (5060), 542
Farquharson, J. (2771), 142
Ferranti, S. Z. de, and Thompson, A. (3419), 235; (3418), 252; (3950), 382; (4596), 461
Field, F. (2480), 58
Fitzgerald, D. G. (2762), 141; (2763), 141
Fitzgerald, D. G., and Jones, T. J. (4178), 384
Fleming, J. A. (2414) 57
Fletcher, J. W. (3661), 293
Frankland, E. (4303), 385
Fyfe, A. L., and Main, J. (2636), 101

GARDNER, J. H. (3255), 211
Gatehouse, T. E., and Kempe, H. R. (2569), 120
Gaulard, L., and Gibbs, J. D. (4362), 400
Gibson, J. R. (3331), 235
Girdwood, W. W. (3171), 209
Glaser, F. C. (4535. Communicated by C. Zipernowsky and M. Deri, both of Austria), 443
Gordon, J., and Gray, J. (4717), 479
Gordon, J. E. H. (2871), 142
Gray, A., and Gray, T. (3441), 253
Greenhill, J. H. (4661), 461
Groth, L. A. (3385. Communicated by C. P. Jürgensen, of Denmark), 235
Gulcher, R. J. (2875), 142
Gumpel, C. G. (2688), 122; (2723), 141; (2756), 141

HADDAN, H. J. (3108. Communicated by C. F. Brush, of America), 191
Haddan, H. J. (3382. Communicated by H. A. Seymour, of America), 235
,, ,, (3814. Communicated by C. F. Brush, of America), 337
,, ,, (3893. Communicated by Dr. H. Aron, of Berlin), 338
,, ,, (5035. Communicated by J. Kernaul, of Munich), 523
Hallett, S. (2560), 72; (2573), 72
Hammond, R., and Goldenberg, L. (4192), 384; (4344), 400; (5097), 524
Handford, T. J. (2336. Communicated by W. A. Stern and H. M. Byllesby, both of America), 36
,, ,, (3244. Communicated by C. A. Van Cleve, of America), 211
,, ,, (3271. Communicated by T. A. Edison), 211; (3355), 234; (3755), 293; (3756), 293; (3752), 317; (3949), 339; (3955), 339; (3961), 339; (3976), 340; (3991), 340; (3995), 340; (3996), 382; (4446), 425; (4884), 505

Harding, C. W. (3827), 337
Hartmann, L. (486), 384
Hatton, R. J., and Paul, A. L. (2654), 120
Healey, W. B. (3485. Communicated by W. L. Hunt, of America), 253
Hedges, K. W. (4025), 383
Henderson, J. L. (4921. Communicated by A. Blondin, of France), 505
Henley, G., and Gedge, S. (3583), 382
Hill, A. W. F. (3534), 292
Hills, A. F. (5078), 542
Hills, F. C. (4561), 443
Holmes, G. C. V., and Emmens, S. H. (4248), 384; (4878), 504
Holmes, N. J. (5059), 523
Hopkinson, J. (3576), 274; (4718), 479
Houghton, E. J. (4289), 385
Howard, C. T. (2896), 143
Husbands, J. D. (4160) 384

IMMISCH, M. (4665), 461
Imray, J. (2128), 37; (2760. Communicated by Paul Jablochkoff, of Paris), 142
,, (3172. Communicated by Paul Jablochkoff, of Paris), 209
,, (3173. Communicated by A. Gentilli, of Leipsic, and L. C. Alexander, of Boulogne), 210
,, (3591), 316
Isaac, F. S. (3033. Communicated by Sir Julius Vogel whilst on his voyage to Australia), 190

JACOB, F. (3281), 212
Jameson, J, (4180), 384
Jarman, A. J. (2565), 72; (2630), 120
Jenkin, Fleeming (3007), 189; (4548), 443
Jensen, P. (3002. Communicated from abroad by D. A. Schuyler and F. Goodyear Waterhouse, both of New York), 189
Jobson, H. C. (3842), 294
Johnson, J. C., and Martin, R. (5019), 523
Johnson, J. H. (2237. Communicated by Dr. Arsène D'Arsonval, of Paris), 35
,, ,, (2990. Communicated by La Compagnie Electrique, of Paris), 189
,, ,, (3079. Communicated by L. Bardou, of Paris), 191
,, ,, (3464. Communicated by J. H. Sutton, of Ballarat), 253
,, ,, (4407. Communicated by A. Bernstein, of Berlin), 275
,, ,, (3698. Communicated by Dr. Arsène D'Arsonval, of Paris), 293
,, ,, (3820. Communicated by T. Ducousso, J. Ducousso, and the Société Anonyme Maison Breguet, all of Paris), 294
,, ,, (3595. Communicated by E. Estienne, of Paris), 317
,, ,, (3980. Communicated by I. M. Hirsh, of Chicago), 340
,, ,, (4159. Communicated by Dr. Arsène D'Arsonval, of Paris), 384
,, ,, (4484. Communicated by P. Uzeh, of Paris), 425
,, ,, (4832. Communicated by Léon de Locht-Labye, of Paris), 504
Jones, E. (5092), 523
Justice, P. M. (1895. Communicated by A. Cruto, of Italy), 20
,, ,, (4073. Communicated by V. Vankeerberghen, of Brussels), 212
,, ,, (3133. Communicated by F. Van Rysselberghe, of Belgium), 253

KELWAY, C. E. (2910), 143
Kennedy, R. (2286), 35; (2629), 73; (4752), 479
Kerner, M. H. (4971), 505
Khotinsky, A. (4490), 425; (4756) 480
Kingzett, C. T. (3802), 317; 4735), 479
Kincaid, J. (2911), 523

LAING, W. (3544), 274
Lake, H. H. (2400. Communicated by H. Lory, of Paris 57
,, ,, (2759. Communicated by R. R. Moffatt, of America), 141
,, ,, (2760. Communicated by J. G. Richard, of Paris), 141
,, ,, (4111. Communicated by S. F. Van Choate, of America), 383
,, ,, (4404. Communicated by S. F. Van Choate, of America), 424
,, ,, (5050. Communicated by S. F. Van Choate, of America), 523
,, ,, (5053. Communicated by S. F. Van Choate, of America), 523
Lake, W. R. (2298. Communicated by J. Kearney, of America), 36
,, ,, (2437. Communicated by C. E. Chinnock, of America), 58
,, ,, (2654. Communicated by E. Weston, of America), 122
,, ,, (2712. Communicated by F. Krizik and L. Piette, both of Pilsen, Austria), 122
,, ,, (2781. Communicated by C. F. de la Roche, of Paris), 142
,, ,, (2804. Communicated by F. Van Rysselberghe, of Schaerbeck, Belgium) 142
,, ,, (2877. Communicated by L. G. Coffinières de Nordeck, of Paris) 142
,, ,, (2992. Communicated by J. J. M. A. Gérard-Lescuyer, of Paris), 189
,, ,, (3160. Communicated by J. Carpentier, of Paris), 204
,, ,, (3795. Communicated by J. Wallace, of America), 212
,, ,, (5279. Communicated by the Standard Time Company (incorporated) of America), 235
,, ,, (3685. Communicated by A. C. Sample and F. Rabl, of America), 275
,, ,, (3689. Communicated by M. Levy, of Paris), 275
,, ,, (3751. Communicated by G. W. Blodgett and A. D. Blodgett, of America), 293
,, ,, (3856. Communicated by N. E. Reynier, of Paris) 294
,, ,, (5280. Communicated by the Standard Time Company (incorporated) of America), 295
,, ,, (3906. Communicated by P. Tihon and E. Rézard, both of Lyons), 338
,, ,, (4246. Communicated by H. J. Cary, of America), 384
,, ,, (4270. Communicated by E. Brard, of France), 384
,, ,, (4458. Communicated by E. Weston, of America), 442
,, ,, (4580. Communicated by H. R. Cassel, of New York) 444
,, ,, (4819. Communicated by J. Wenström, of Orebro, Sweden), 504
,, ,, (84. Communicated by C. E. Ball, of America), 523
,, ,, (5142. Communicated by B. Egger, of Vienna), 542
Lalance, A., and Bauer, M. (4555), 443
Lane, J. (2752), 141
Lane-Fox, St. George (4625), 461
Langdon, W. E. Fuller, J. C., and Fuller, G. (4450), 425
Leash, A. R., and Smith, F. P. (3099), 191; (3161); 209
Lewis, H. R., and Smythe, W. C. (4049), 383
Liardet, J. E., and Donnithorne, T. (4991), 505
Lineff, A. L. (3520), 274; (4158), 384
Lorrain, J. G. (2907. Communicated by A. Dunand, of Paris), 143
,, ,, (3547. Communicated by J. André, of Paris), 274
,, ,, (3575), 292; (5146), 542
Lowne, R. M. (3128), 234
Lyte, F. M. (4525), 443

MACAULAY-CRUIKSHANK (3048. Communicated by W. E. Banta, of America), 190
Mackean A. (5098. Communicated by A. Kryzsat, of Moscow), 524
Mackenzie, J. (4512), 443
Mackenzie, J. K. D. (4046), 383
Marsh, J. C., and Smith, P. J. (4005), 383
Marshall, H. J. (4168), 384
Mathieson, J. (2734), 122
Matthews, R. (3334), 316
McEvoy, C. A., and Mathieson, J. (4422), 425
Mewburn, J. C. (3054. Communicated by F. Rigaud, of Paris), 190
Mills, B. J. B. (3779. Communicated by W. M. Thomas, of America), 382
,, ,, (4350. Communicated by J. N. Mackenzie, of America), 400
,, ,, (5148. Communicated by T. Chutaux, of Paris), 542
,, ,, (5149. Communicated by T. Chutaux, of Paris), 542
Morgan-Brown, W. (4367. Communicated by F. Schmidt, of Prague), 4367
Mori, F. (3821), 294; (3822), 294
Mosley, C. (2451), 37
Mott, S. D. (4645), 461; (4646), 461
Muirhead, A. (2658), 121
Munro, J., and Warwick, B. (3557), 274
Munro, J. M. M. (3322), 235

NEEFE, A. G. de, and Desfossés, E. (4931), 501
Newton, F. M. (3570), 274
Newton, H. E. (3414. Communicated by O. Zadig, of Paris), 252
,, ,, (4087. Communicated by the Société Universelle d'Electricité Tommasi, of Paris), 383

OLIPHANT, J., and BURR, E. B. (4845), 541

PAGE, G. S. (2518), 99; (3219. Communicated by J. M. Stearns, junr., of America), 210
Parker, T., and Elwell, P. B. (2917), 144
Parr, E., and Gibson, J. R. (5109), 542
Pass, E. de (2674. Communicated by J. Gloker, of Paris, 121
,, ,, (3070. Communicated by C. Roosevelt and B. Abdank, of Paris), 190
Pfannkuche, A. (2845), 142; (3861), 337
Phillips, F. C. (4691), 479
Phillips, J. F. (4676. Communicated by C. H. F. Müller, of Hamburg), 461
Phillips, W. A., and Phillips, S. E. (2571), 72
Pitkin, J. (2391), 57
Price, A. P. (2722), 122
Pritchard, O. G. (2974), 189; (3655), 275; (4771), 480
Pulvermacher, I. L. (3318), 235

RECKENZAUN, A. (3473), 253; (4764), 480
Reddie, A. W. L. (4220. Communicated by A. Krasza and J. Schaschl, of Austria), 384
Rhodes, B., and Bingswanger, G. (2501), 58
Rogers, J. B. (1618), 523
Rogers, J. R. (3616), 254
Rogers, F. M. (3236), 211
Rose, A. W. (2641), 120
Rose, O. (2567), 99
Ross, A. Q. (3430. Communicated by T. J. Bell, of America), 235
Ross, O. C. D. (4355), 400

ST. GEORGE, A. F. (4696), 479
Sarney, T. S., and Alprovidge, J. M. (3240), 211
Schlaefli (3233), 211
Sellon, J. S. (2818), 142
Sennett, A. R. (4492), 442
Serraillier, A. (4988), 505
Shippey, A., and Punshon, R. (2293), 36
Sibley, C. E. (3753), 293
Simons, R. H. (2270), 35
Sinnock, W. (4352), 400
Skrivanow, G. G. (4460), 442
Slater, T. (4251), 384; (4266), 384

Smith, J. J. C. (4768) 480
Smith, T. T. (4162), 541
Smith, W. S. (3846) 294
Snell, C. S. (4930), 212; (4065), 383
Snell, W. H. (2905), 143
Somoff, J. L. (3705), 293
Somzée, L. H. M. (3465), 253; (4079), 340
Sorley, C. (2945), 144
Spence, W. (3047. Communicated by M. Kotyra, of Paris), 190
Sperry, E. A. (3025), 190
Sprague, J. T. (2902), 143
Statter, J. G. (4304), 385
Strangways, H. B. T. (4778), 503
Strickland, W. (4869), 504
Stuart, J. M. (2232), 20; (2233), 20
Swalwell, J. (2456), 58
Swan, A. (2898), 143
Swan, J. W. (4461), 425
Swan, J. W., and Swan, C. (4390), 401.
Swift F., and Reade, A. J. M. (4543), 523

TATHAM, R. (4777), 480
Tatham, R., and Hallings, A. (4809), 480
Taylor, W., and King, F. (3409), 235
Teske, C. A. (4305), 400
Theiler, R., and Theiler, M. (4044), 383
Thompson, Silvanus P. (2578), 72; (3803), 317; (4003), 340; (5122), 524
Thompson, W. P. (3420. Communicated by P. Payen and A. Sandron, both of France), 253
Thompson, W. P. (4454. Communicated by G. F. M. J. W. Brown and H. D. Hyde, of America), 442
Torr, C. W. (5129), 524
Toynbee, E. (3226), 210
Tribe, A. (2263), 35

VARLEY, C. F. (5015), 505; (5016), 505; (5017), 505
Varley, F. H. (2776), 142
Varley, T., and Greenwood, H. B. (2248), 20; (3129), 209
Vaughan, G. E. (3142. Communicated by S. Trott and F. A. Hamilton, both of Canada), 209
Verity, J. (3619), 317
Villiers, P. de (4148), 384
Vincent, C. W. (3491. The result partly of a communication to him by William Buller Fullerton Elphinstone), 58
Vœux, F. Des (2604. Communicated by A. Bernstein), 99
Voice, E. L. (2288), 35; (4567), 443
Volk, M. (2962), 189

WALKER, S. T., and OLLIVER, F. G. (4780), 480
Watt, A. (3097), 191; (4431), 425
Webb, B. W., and Jensen, H. P. F., and Jensen, J. (4712), 479
Welles, F. R. (3882. Communicated by C. E. Scribner and W. R. Paterson, both of America), 212
Werdermann, R. (2364), 36; (3150), 252; (3757), 294
Westphal, Carl (2823), 189
Wetter, J. (2660. Communicated to him by W. Stanley, of America), 121
Whitley, J. (4889), 505
Wier, M. A. (2686), 121
Wilde, H. (2256), 35; (3834), 294
Wilkinson, A. (3003), 189
Willard, F. L. (2803), 142; (3042), 190
Williams, J. S. (2558), 121; (4034), 442
Wimshurst, E. J. (4816), 504
Winch, G. L. (3532), 254
Woodley, R. H., and Joel, H. F. (3221), 210
Woodman, F. W., and Aylesbury, T. W. (3019), 234
Woods, J. E. T. (3975); 340 (3974), 441
Woodward, H. (2643), 101; (4273), 384
Wright, T. (4127), 383
Wynne, W. R. (4366), 400

YEATES, S. M. (3335), 234

ZANNI, GEMINIANO (2740), 122; (2741), 122